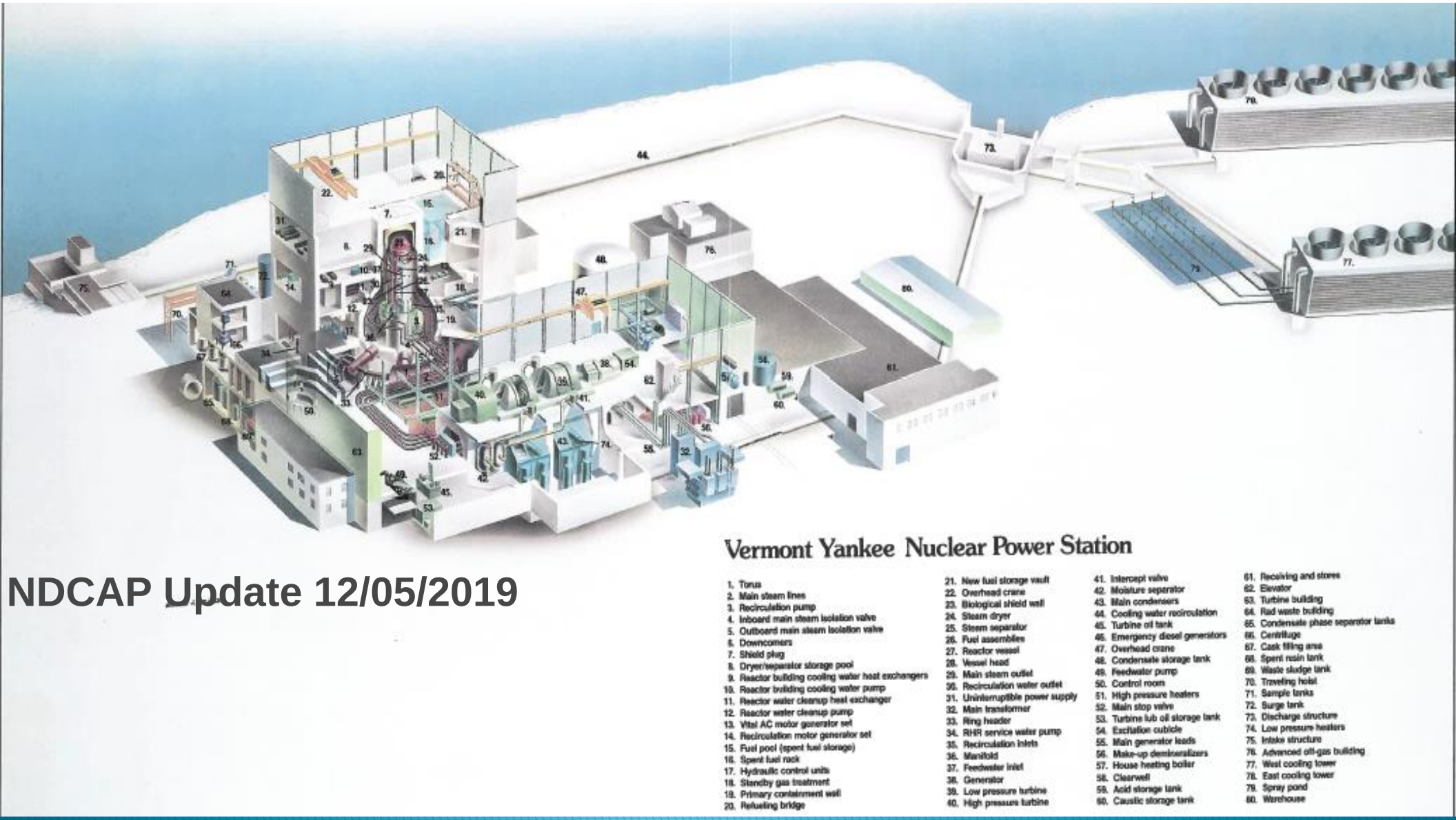
NorthStar VTY Decommissioning



Vermont Yankee Nuclear Power Station

1. Torus
2. Main steam lines
3. Recirculation pump
4. Inboard main steam isolation valve
5. Outboard main steam isolation valve
6. Downcomers
7. Shield plug
8. Dryer/separator storage pool
9. Reactor building cooling water heat exchangers
10. Reactor building cooling water pump
11. Reactor water cleanup heat exchanger
12. Reactor water cleanup pump
13. Vital AC motor generator set
14. Recirculation motor generator set
15. Fuel pool (spent fuel storage)
16. Spent fuel rack
17. Hydraulic control units
18. Standby gas treatment
19. Primary containment wall
20. Refueling bridge
21. New fuel storage vault
22. Overhead crane
23. Biological shield wall
24. Steam dryer
25. Steam separator
26. Fuel assemblies
27. Reactor vessel
28. Vessel head
29. Main steam outlet
30. Recirculation water outlet
31. Uninterruptible power supply
32. Main transformer
33. Ring header
34. RHR service water pump
35. Recirculation inlets
36. Manifold
37. Feedwater inlet
38. Generator
39. Low pressure turbine
40. High pressure turbine
41. Intercept valve
42. Moisture separator
43. Main condensers
44. Cooling water recirculation
45. Turbine oil tank
46. Emergency diesel generators
47. Overhead crane
48. Condensate storage tank
49. Feedwater pump
50. Control room
51. High pressure heaters
52. Main stop valve
53. Turbine lub oil storage tank
54. Excitation cubicle
55. Main generator leads
56. Make-up demineralizers
57. House heating boiler
58. Clearwell
59. Acid storage tank
60. Caustic storage tank
61. Receiving and stores
62. Elevator
63. Turbine building
64. Rad waste building
65. Condensate phase separator tanks
66. Centrifuge
67. Cask filling area
68. Spent resin tank
69. Waste sludge tank
70. Traveling hoist
71. Sample tanks
72. Surge tank
73. Discharge structure
74. Low pressure heaters
75. Intake structure
76. Advanced off-gas building
77. West cooling tower
78. East cooling tower
79. Spray pond
80. Warehouse

NDCAP Update 12/05/2019

NorthStar Nuclear Decommissioning Company, LLC

Simple Priorities

SAFETY with all we do: Target Zero (accidents)

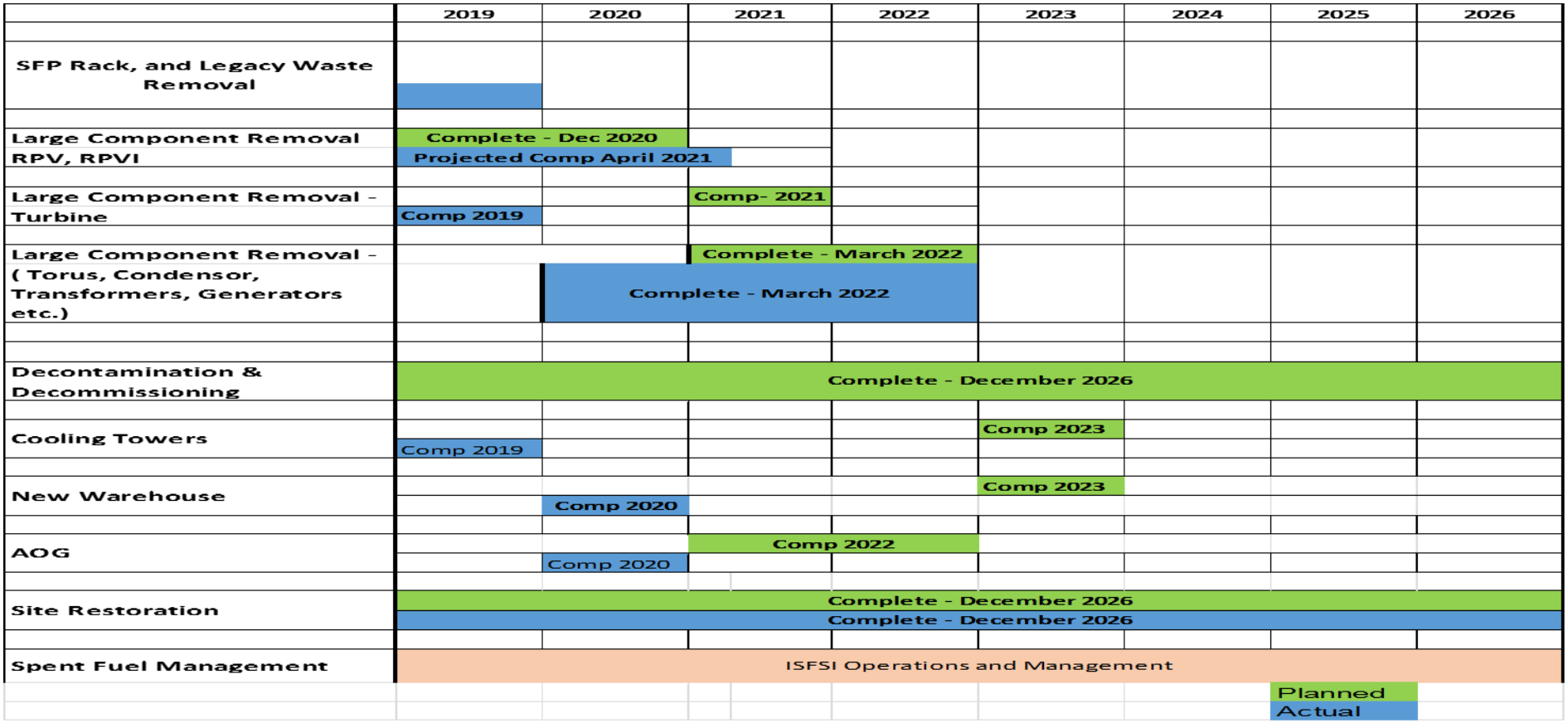
Radiological, Environmental, Industrial, Nuclear

Do it right. Do it safe.

Project Schedule – Overview (Re-Cap)

	NorthStar Ownership (Target 01.11.2018)							Partial License Termination (Target 12.31.2026)					License Termination (Est. 12.31.2052)
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027 to 2051	2052
Dry Fuel Storage Program (Fuel on ISFSI - Dec. 31, 2018)	Completed by Entergy												Final Site Restoration & License Termination
Large Component Removal (RPV, RPVI, etc.)		Engineering & Planning		Complete - March 2022									
Decontamination & Decommissioning		Pre-Closing Work		Complete - December 2026									
Spent Fuel Management				ISFSI Operations and Management (2019 thru 2026)								ISFSI Only Operations Period (2027 thru DOE Fuel Pick-up)	

Project Schedule 19&20 Overview(Re-Cap)



- Critical Path:
  - Large Component
    - RVI/RV Segmentation – 2019 to 2021
    - Large Components – 2019 – 2022
- 2019 – Turbine Components/Clear Main Turbine Deck (concurrent NS Critical Path)

Performance Update

- SAFETY: Acceptable

Zero NorthStar OSHA Recordable Lost Time Accidents with over 260,000 person hours worked on site YTD.
ALARA dose goals for 2019 met.

- REGULATORY: GOOD

Zero Cited and Non-Cited Violations. QA Audits. Self Assessments and Peer Benchmarks confirm safe, compliant and conservative performance.

- PRODUCTION: Acceptable

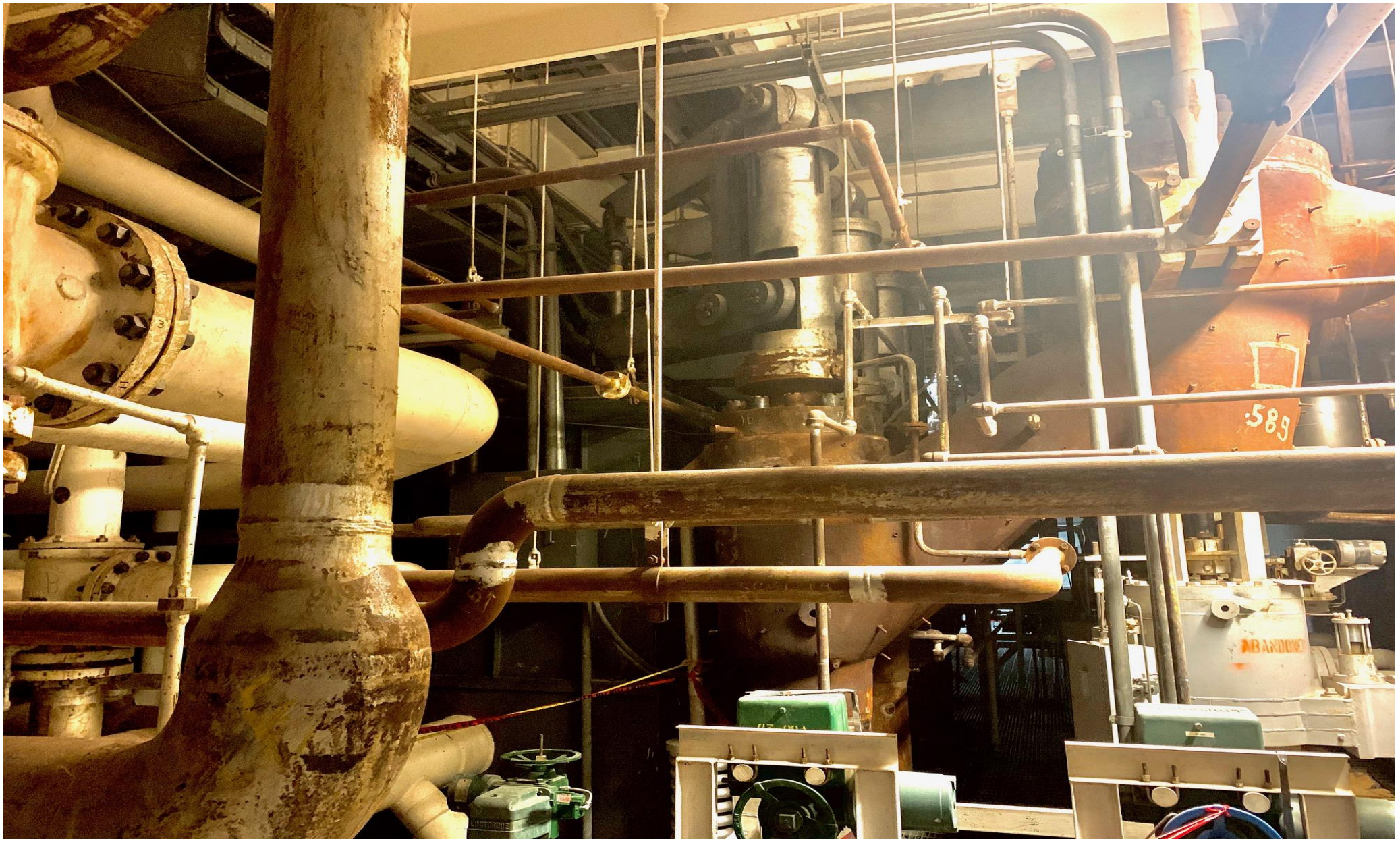
Overall project schedule on track. Reactor removal project remains slightly behind target following transaction delays. Bulk decom work and Site Characterization advancing ahead of initial projections.

(Review)Turbine removal

Turbine Deck Progress (11/26 Turbine gone)

Turbine deck (lower LP casing) (11/26)

Heater Bay Insulation Removal (beneath turbine)



Super Sack survey/Prep for rail transport

Rail Transport Operations (Ongoing)

DOT exempt liquids tanker

LAW gondola cars

Turbine Building Water Management

- Ingress leakage rate steady at approximately 300 GPD
- Shipments by rail as needed. (Approx. 1 every 2 months)
- Tritium levels continue to diminish as expected (no source term remains), last highest well source sample at about 7,000 pico curies per liter and continues to lower.

(for reference: the EPA Drinking Water Standard 20,000 pico curies per liter)

- Ongoing mitigation efforts include intercept well(s) installation at North West Turbine Building structure periphery.

Reactor Vessel Segmentation Update

Containment Head complete, shipped.

Reactor Head complete, packaged and staged for shipment.

Steam Dryer removed, segmented, packaged, shipped.

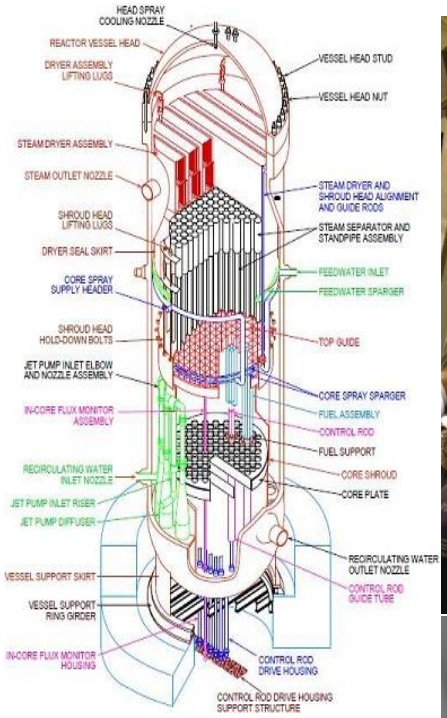
Flood up complete. Steam Separator next. (Remaining components will be done underwater)

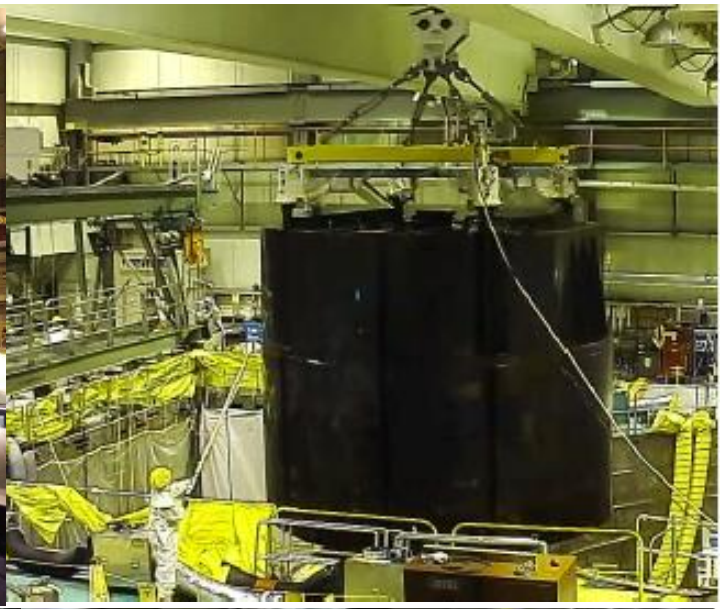
Select components within will be cut up and packaged for storage at the ISFSI within a Cask similar to that in which the Spent Fuel is stored.

These components (primarily the upper core grid) have been carefully evaluated, and are designated as Greater Than Class C (GTCC) waste due to their high activation levels.

RV Closure Head | Steam Dryer | Steam Separator | Upper Core Grid | Guide Tubes | Core Plate Assembly | Shroud Cylinder | Jet Pump Assemblies | RV Nozzles | Reactor Vessel

(Re-Cap) ORANO Segmentation of Reactor





Reactor Head (done)
Steam Dryer (done)
Reactor studs (done)
Underwater setup (done)
Steam Separator (next)

How about a little video??

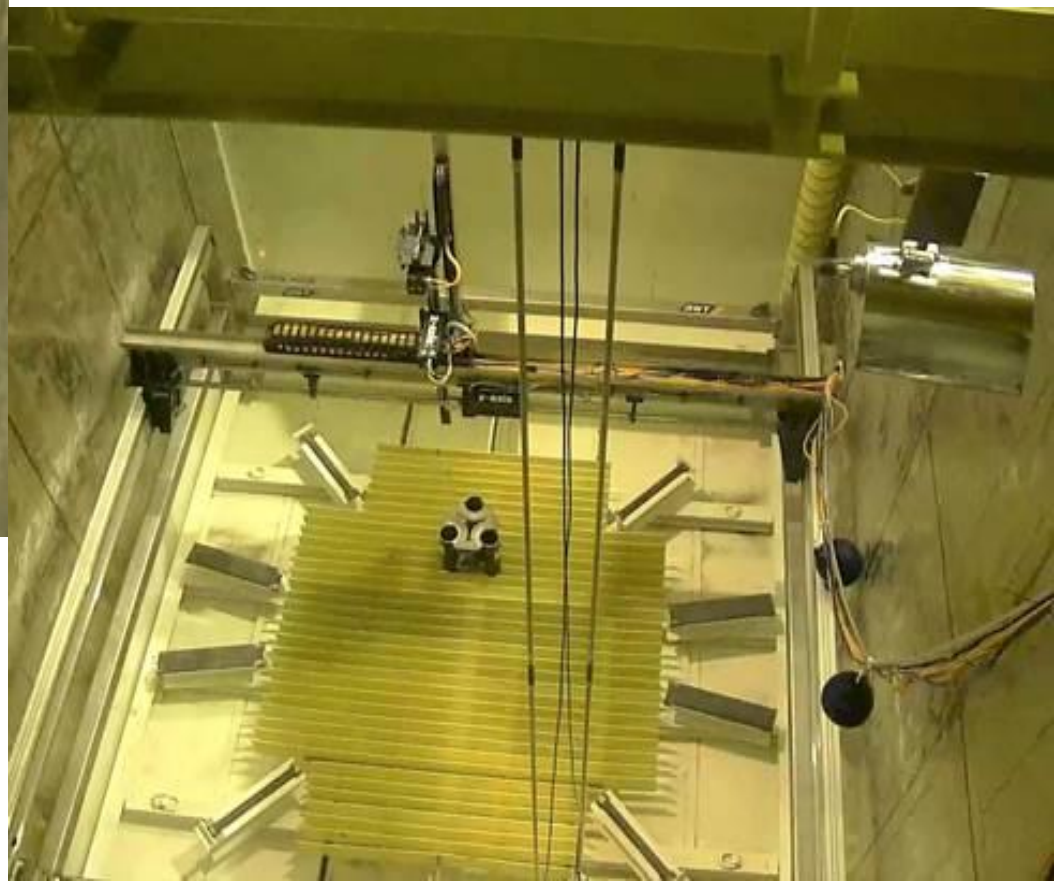
https://www.youtube.com/watch?v=-HSeTZDPYF8

Working Bridge installed for underwater operations

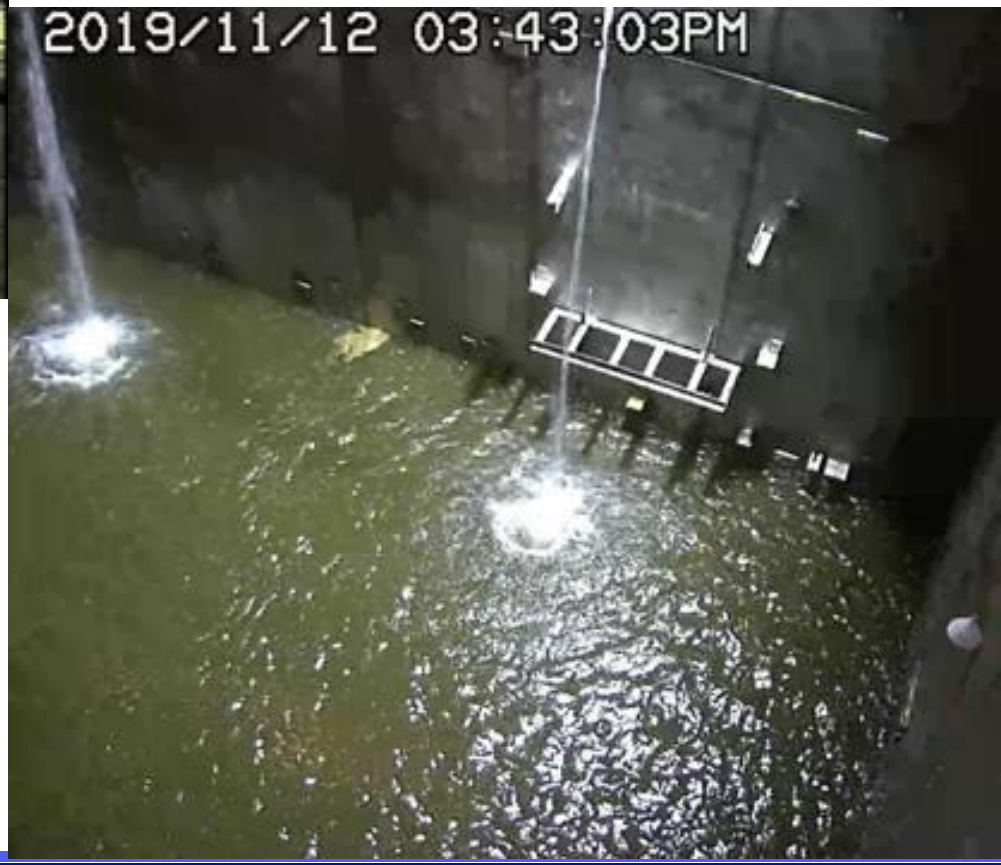
Water jet cutting equipment functional testing/set up

Spent Fuel Pool wall coating removal/Prep for “Wet Ops”

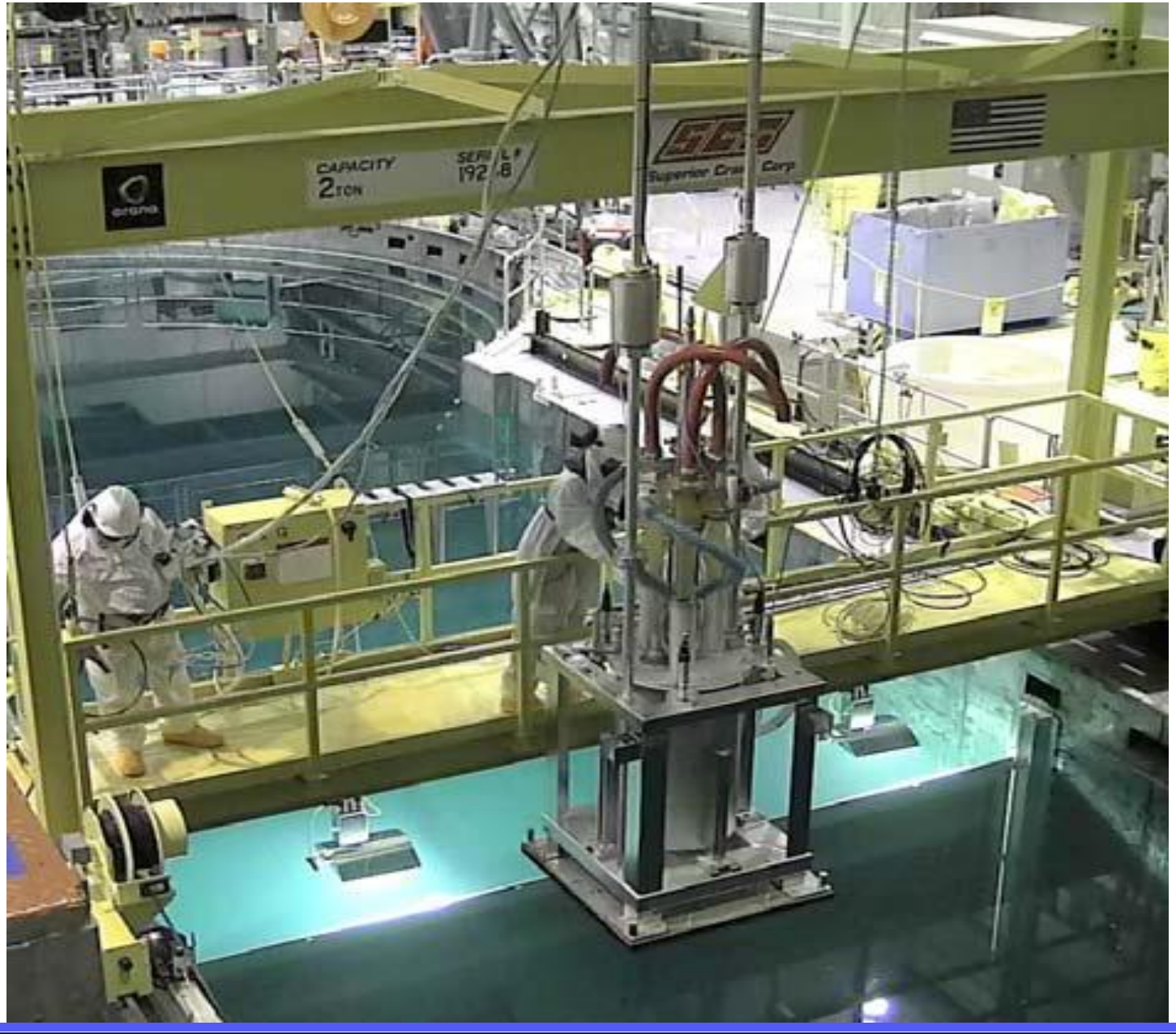
Set up for Underwater cutting/material staging



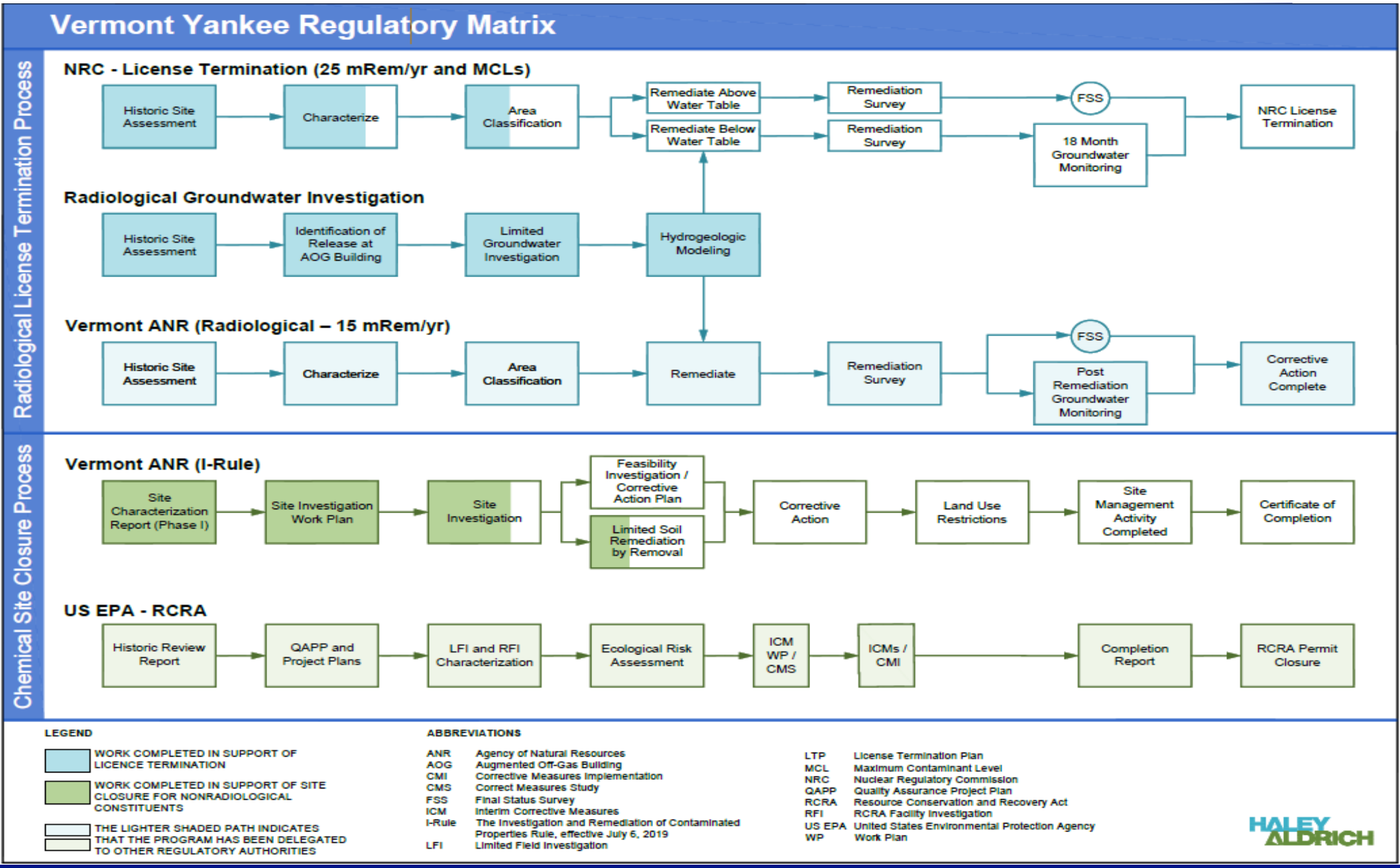
Installing Gate/Wall in DSP (Re)filling Spent Fuel Pool



Installing demin for Underwater Vessel work(11/26)



Characterization/Remediation Process



Baseline Site Radiological Survey

Wood E&IS' Orion *ScanPlot*^{SM} with the Argo *Conquest* ultra all-terrain vehicle (UTV)

Wood E&IS' Orion *ScanPlot*SM System Configured On The Argo *Conquest* Ultra All-Terrain Vehicle

- The system was equipped with four SS-5 Sodium Iodide (NaI) spectrometers as the primary radiation detectors.
- These detectors were positioned 12" above the ground and spaced 16" on center perpendicular to the direction of travel.
- The *ScanPlotSM* system was equipped with onboard Javad Triumph global positioning system (GPS) sensor providing spatially referenced coordinates for each radiation measurement logged.
- A second Javad Triumph was deployed as a stationary base to provide location-correction data to the roving GPS on the *ScanPlot*SM system to increase the accuracy of the location measurements.

Radiological Survey Process

- A reference background area was surveyed in an area that was known to have similar soil types to the areas under investigation and is un-impacted by VYNPP operations.
- All accessible areas in the NorthStar VY property were surveyed, including the Controlled and the Restricted Areas.
- The primary detectors dataset for the VYNPP survey consisted of 1,343,624 individual measurements.
- The data produced during the Orion *ScanPlot*SM survey of the VYNPP site provides requisite information to guide the decommissioning and license termination processes and documents the pre-demolition, or “as-found” radiological condition of the VY Site property.

Non-Rad Site Characterization: 2019

- What have we completed?

  - ✓ Phase I or Initial Conceptual Site Model complete
    - This combines site history and past work to understand where to look for issues. Identified 17 Areas of Concern

  - ✓ Site Investigation Field Program and Report complete
    - Received comments from DEC

  - ✓ Supplemental Site Investigation Program complete
    - Received comments on work plan from DEC

  - ✓ Three rounds of Quarterly Groundwater Sampling completed

What is Next? 2020

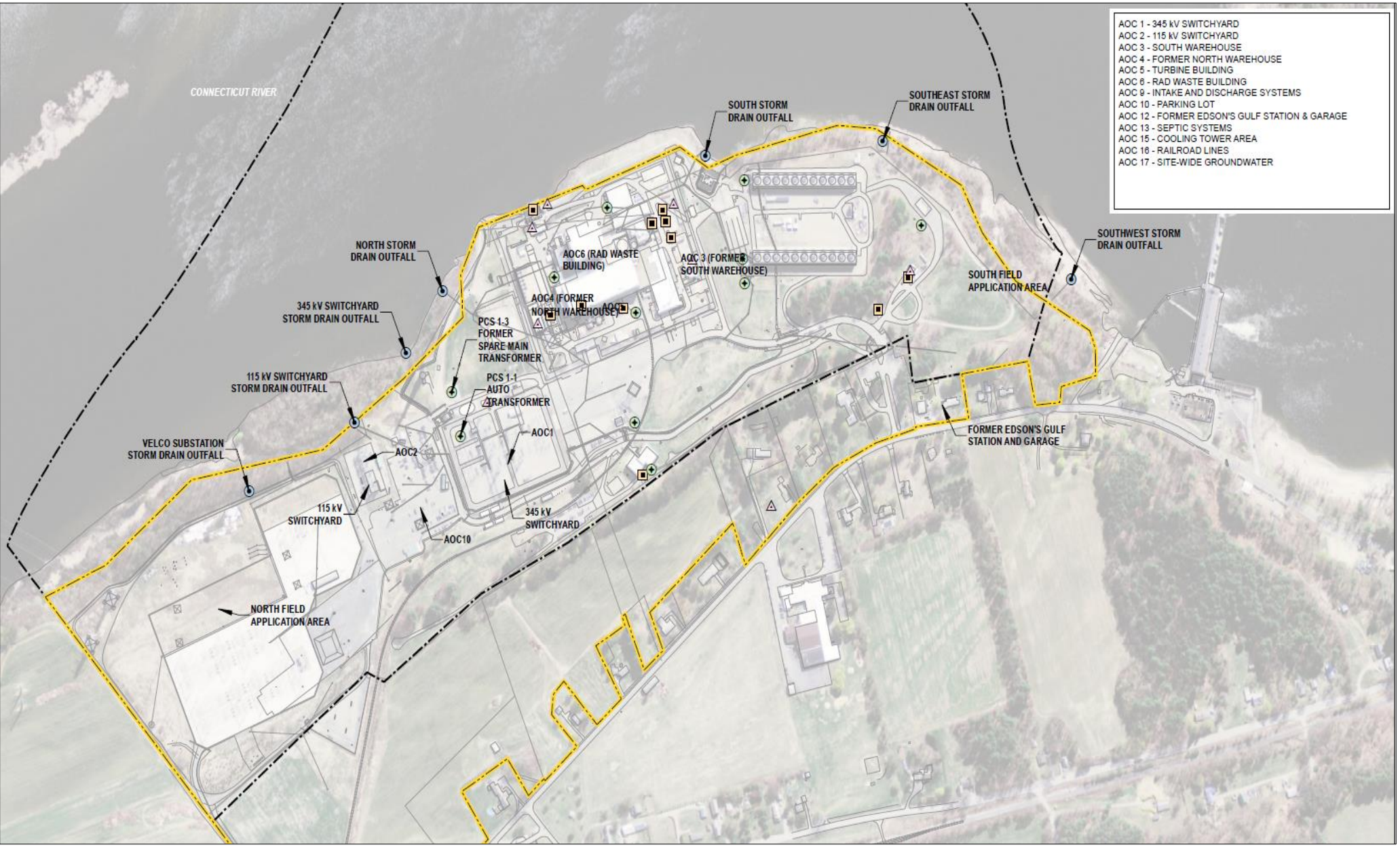
- What is happening now?

  - ✓ Updating Revised Site Investigation Report to include additional data and address incorporate DEC and their subcontractor, ATC, comments (Data expected to be received in mid to late December)

- What is next?

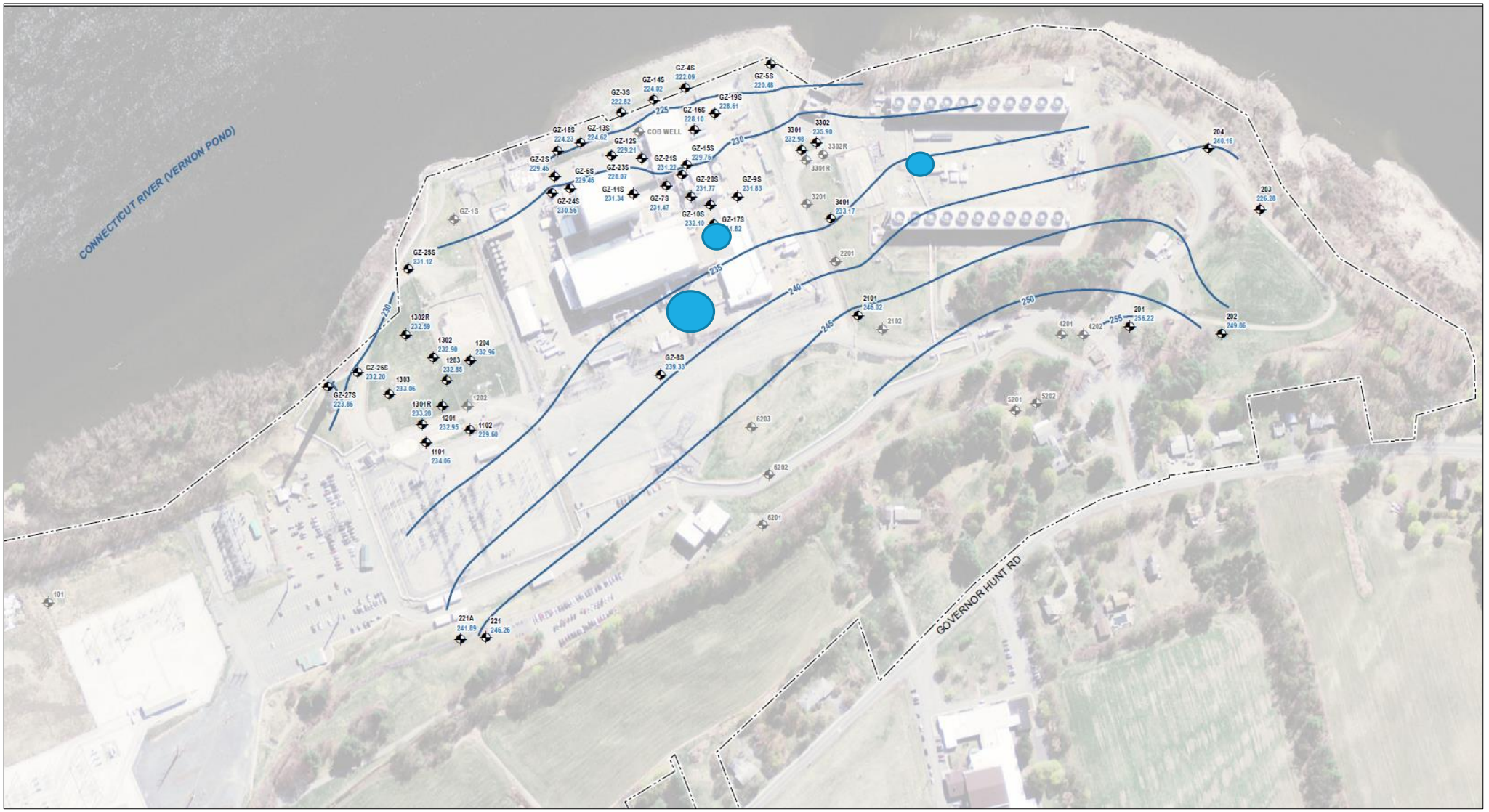
  - ✓ Design Remediation to clear up and close out Areas of Concern where applicable
  - ✓ Remediate soils in areas that can be accessed
  - ✓ Continue to support applicable permits and sampling requirements
  - ✓ Continue with biweekly meetings with ANR

17 Areas of Concern identified



Sample Locations as of October 2019

Potential Groundwater Impacts



Area where groundwater may have non-radiological (i.e. chemicals above VT Standards). Mostly from historic fuel oil leaks.

Findings By AOC

Area of Concern	*Investigation of Accessible Areas Complete?*	*Remediation Needed?*	*Remaining Data gaps*
AOC 1 - 345 kV Switchyard	Yes	No	Velco has a 99 year lease. Soils within the yard will require characterization after lease is over.
AOC 2 - 115 kV Switchyard	Yes	No	Velco has a 99 year lease. Soils within the yard will require characterization after lease is over.
AOC 3 - South Warehouse	Yes	No	Below slab, after removal
AOC 4 - Former North Warehouse	Yes	No	N/A
AOC 5 - Turbine Building	Yes	No	Soils under the admin building to be evaluated after removal.
AOC 6 - Rad Waste Storage Building	Yes	No	Below slab, after removal
AOC 7 - Fuel Storage Tanks	Yes	Yes	Former UST SW of Turbine Building and piping associated with the 75 gal FOST. PAH (fuel oil/diesel impacted media to be excavated & disposed off -site).
AOC 8 - Transformers	Yes	No	Area directly under ABB transformer. To be coordinated with AOC 7 remediation
AOC 9 Intake and Discharge Systems	Yes	No	N/A
AOC 10 - Parking Lots	Yes	No	To be evaluated after pavement is removed.
AOC 11 - Haz Materials Storage Areas	Yes	No	Soils below the slab, after removal
AOC 12 Former Edson's Gulf Station	Yes	Yes	Limited PAH excavation
AOC 13 - Septic Systems	Yes	Yes	Potential PFAs in residual spreading areas, and stockpiled soils
AOC 14 - Stormwater Outfalls	Yes	TBD	Risk assessment to evaluate sediments
AOC 15 - Cooling Tower Area	Yes	Yes	limited impacted area - being evaluated
AOC 16 - Railroad Lines	Yes	Yes	Shallow soil removal
AOC 17 - Sitewide Groundwater	Yes	Yes	Limited MNA, no active GW treatment needed

Shaded lines indicate AOCs where remediation is planned.

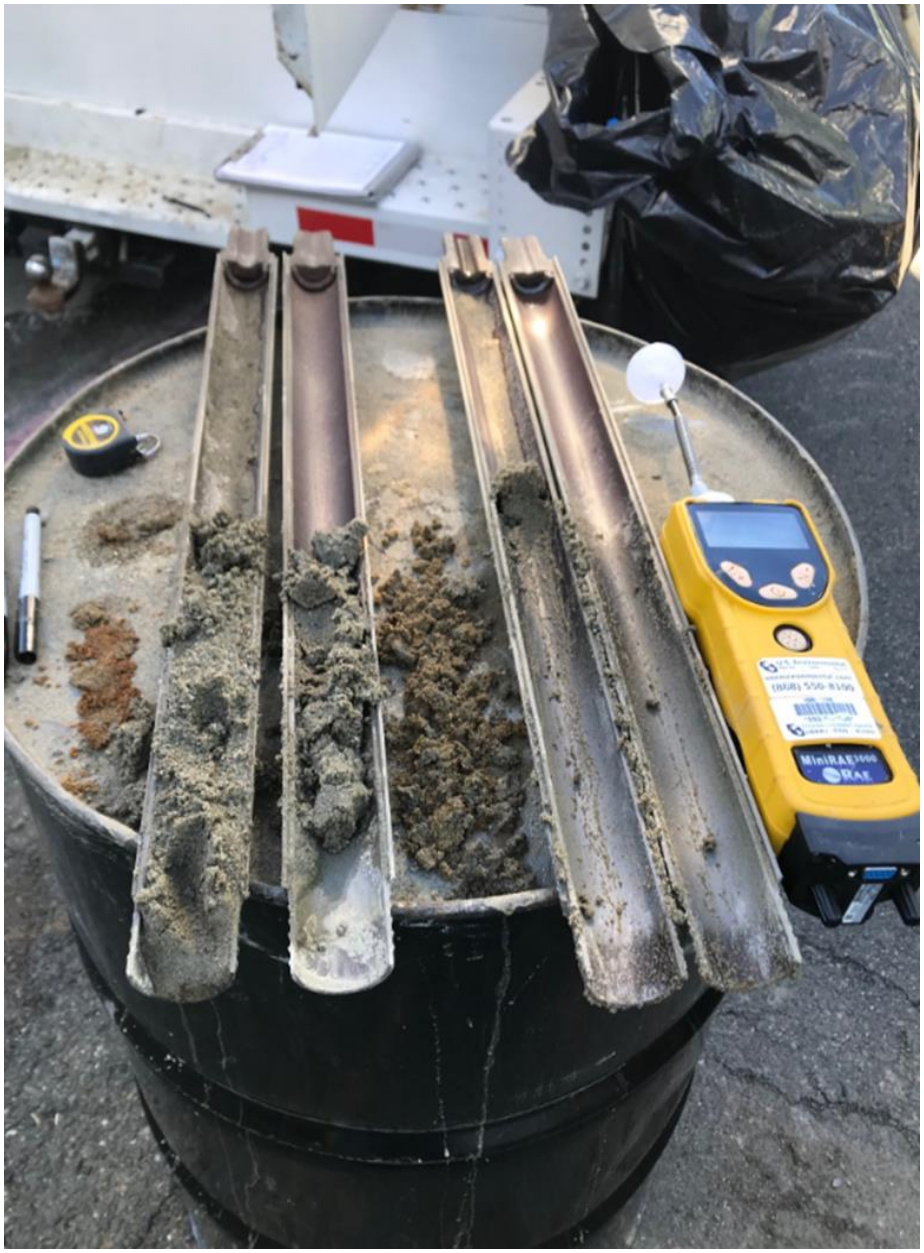
Additional VT Requirements: PFAs

(Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals)

- PFAs are in the news and we are sampling for them
- Low concentrations in soils and groundwater
  - *Results from all samples collected to date are below the VT GES (also below the drinking water standards)*

- Where are PFAS detected on site potentially from?
  - Fire fighting foam
  - Septic Residuals
  - Off site migration onto VY property

Groundwater & Soil Investigation Activities



(Recap) Non-Rad Investigation Milestones

- Site/License Transfer to NorthStar January 11 2019
- Site Investigation (SI) Report due/submitted on July 11, 2019
  - Identified 17 Areas of Concern for investigation of soils, sediment and groundwater
  - VT ANR approved work plan and provided review of SI Report
- Three rounds of quarterly groundwater samples collected from 32 wells. (Includes 6 new wells and 32 existing wells)

- Supplemental Site Investigation:
  - Addressed data gaps at 7 Areas of Concern
  - Included suggested locations from ANR
- Revising SI Report; to be completed in Q1 2020
- Proposed soil remediation at 4 AOCs
- Groundwater has limited detections of fuel oil that will be remediated likely via monitored natural attenuation after source removal.

What is Next?

- Validate the data collected this fall
- Draft Revised Site Investigation Report
- Continue the quarterly groundwater sampling program
- Repair well network as needed and abandon wells that are damaged
- Excavate (or remediate) impacted soils for off site disposal

Stakeholder Engagement

Survey conducted for determining what, if additional efforts warranted by NorthStar to ensure an appropriate public engagement process regarding the decommissioning and restoration of the VY Station site. This has included exploration of forming a subcommittee of the existing NDCAP for this purpose.

- Overall results indicate NorthStar participation at NDCAP continues to effectively perform this function
- Transparency remains important. Some degree of trust deficit was "inherited" by NorthStar. (Although generally good marks so far)
- Timely updates on progress/budget performance/schedule/waste transportation/disposal and upcoming work.
- Some improvements could be made with the NorthStar VY Decom Website-- to be "updated more frequently" and to "tell more of the human story" was suggested.

Stakeholder Engagement

- Archaeological Cultural Sensitivity Study for VY site completed.
- Archaeological Cultural Sensitivity Training developed and conducted with all Excavation/Equipment Operators and Environmental staff

Special thanks to:

Rich Holschuh & Chief Longtoe (Abenaki Tribal Representatives)

Jess Robinson (VT State Archaeologist)

Jeff Maymon and Colby Child (R. Christopher Goodwin & Assoc's, Inc.)

Stakeholder Engagement

- Vernon Planning Commission and Select Board tour/meeting (9/27)

- Potential redevelopment of site with Energy project development professionals
- Included a review of Vernon Town Plan
- Review of Vermont Council on Rural Development (Report and Action Plan from 2016)
- Ongoing dialogue with Town of Vernon staff as needed

<u>Special thanks to</u>:

Josh Unruh (Vernon Town Select Board Chair)
Michelle Pong (Vernon Town Administrator)
Bob Spencer (Vernon Planning Commission)
Sara Coffey (Windam-1/Guilford/Vernon; State Representative)

Stakeholder Engagement

- Engagement with Antioch University New England (AUNE) for proposal to perform a VY site study/land use inventory for potential redevelopment options.

<u>Special thanks to</u>:

Josh Unruh, Vernon Select Board Chair (and the Select Board)
Michelle Pong, Vernon Town Administrator
Bob Spencer, Vernon Planning Commission (and the Planning Board)
Dr. Christa Daniels (Affiliate Professor, AUNE)

Stakeholder Engagement

- Baseline Condition Assessment conducted for Governor Hunt Rd conducted on 9/25/2019

To determine impact and set condition threshold for repairs as a result of increased traffic due to Decommissioning activities by NorthStar

Initial assessment completed with GHH Road in overall good condition. To be repeated annually.

<u>Special thanks to</u>:

Dave Walker (Vernon Town Road Commissioner)

Stakeholder Engagement

Tour on 11/14 with Representative from New England Coalition on Nuclear Pollution

- Full walk down of site conducted
- Decommissioning progress and condition of facility shared
- Discussion on improving transparency including NS committing to:

  Updates on regular basis and quarterly site tour visits with NEC

Special thanks to Clay Turnbull (NEC)

Stakeholder Engagement

Annual E-Plan Exercise with State(s) participation on 11/13/2019

Annual Contaminated Injured Patient Drill/Exercise on 10/21/2019

- Performance Satisfactory for both Exercises with no significant gaps
- Several enhancements identified and incorporated
- Good coordination and communications with participating groups

Special thanks to: Tony Leshinskie(VT State Nuclear Engineer)
Taylor Wellington (BMH)
Drew Hazelton & Staff (Rescue Inc.)

QUESTIONS?